

(g) fixing said flexible printed circuit sheet onto said first surface of said signal processing circuit substrate such that said value adjustment portion of said device is in alignment with a through-hole formed throughout said signal processing circuit substrate.--

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C Amend claim 48 as follows:)

--48. (amended) The method as set forth in claim 47, further comprising the step of (h) adhering a reinforcing plate on a first surface of said flexible printed circuit sheet across a width of said flexible printed circuit sheet, said step (h) being carried out prior to said step (d).-

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R E M A R K S

The application has been amended so as to place it in condition for allowance at the time of the next Official Action.

Claims 1-54 are pending. Claims 1, 20, 40 and 47 are independent claims.

The specification has been amended as to form.

The Official Action objected to claims 1, 20, 40, 41, 47 and 48. These claims have been amended responsive to the

noted informalities. Withdrawal of the claim objection is therefore solicited.

Claims 1-39 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3-7, 9, 10, 13, and 23-25 of copending Application No. 09/739,236 in view of ASAI et al. 6,409,1259 and in further view of MCLAUGHLIN et al. and MURAMATSU et al. 5,703,665.

Enclosed herewith is a timely filed terminal disclaimer in compliance with 37 CFR §1.321(c) in order to overcome the obviousness-type double patenting rejection. No comment is being made as to the merit of this rejection.

Claims 40-46 are rejected under 35 USC §103(a) as being unpatentable over ANDERSON et al. 6,292,370 in view of ASAI et al. in further view of MURAMATSU et al. and MCLAUGHLIN et al.

Claims 47-54 are rejected under 35 USC §103(a) as being unpatentable over GOSHIMA 6,316,731 in view of ANDERSON et al. in further view of ASAI et al., MCLAUGHLIN et al. and MURAMATSU et al.

The obviousness rejections are not believed to be viable for the below reasons.

Claim 40 recites a method of fabricating a signal processing circuit substrate. Importantly, the recited substrate is for use in a liquid crystal display unit, where a device is mounted on a first surface of the signal processing circuit

substrate, the device having a variable value and including a value adjustment portion through which said variable value is adjusted.

Claim 40 recites that steps of:

"(a) mounting said device onto an upper surface of a flexible member such that said value adjustment portion upwardly faces;

"(b) bending said flexible member at first lines thereof towards said lower surface;

"(c) bending said flexible member at second lines towards said upper surface, said second lines being located between said device and said first lines; and

"(d) fixing said flexible member at its opposite ends onto said first surface of said signal processing circuit substrate such that said value adjustment portion is exposed through a through-hole formed through said signal processing circuit substrate."

The Official Action acknowledges that ANDERSON et al. do not disclose the step of "(a) mounting said device onto an upper surface of a flexible member such that said value adjustment portion upwardly faces."

Although not acknowledged by the Official Action, it is clear that ANDERSON et al. only teach making a flexible circuit board. ANDERSON et al. do not teach or suggest, as recited, a

method of fabricating a signal processing circuit substrate. Importantly, ANDERSON et al. do not teach or suggest a method wherein the recited substrate is for use in a liquid crystal display unit, where a device is mounted on a first surface of the signal processing circuit substrate, the device having a variable value and including a value adjustment portion through which said variable value is adjusted.

Accordingly, the teachings of ANDERSON et al. are not seen as relating to the recited method. Claim 40 has been amended to make explicit that the method steps produce a signal processing circuit substrate for a liquid crystal display unit with the variable value device mounted on the first surface of said signal processing circuit substrate.

Accordingly, for this reason the recited method is not believed to be taught or suggested, regardless of the teachings of the secondary references.

Further, ANDERSON et al. are not seen as teaching recited steps (b) - (d).

ANDERSON et al. only teach making a flexible circuit board having bends 42, 44, 46 to form a first portion 12 coupled to a second portion 14 as per Figures 3-4. There is no teaching as to bending a flexible member (steps b-c) and attaching the bent flexible member to a surface of a substrate having a through-hole.

Claim 40 recited "(b) bending said flexible member at first lines thereof towards said lower surface..." Note the recitation of "first lines." ANDERSON et al. do not make this teaching. See column 3, beginning at line 33 teaching the first bending being at a single line to form bend 40. Thus, this step is not taught.

The next recited step of claim 40 is "(c) bending said flexible member at second lines towards said upper surface, said second lines being located between said device and said first lines ..."

As noted, there is not teaching as to any device. Indeed, the teaching is to bend at a tracing area. See Figure 1, region 16. Thus, ANDERSON et al. teach away from the present invention.

Further, note the recitation of the second lines being located between said device and said first lines. See that bends 42 and 46 (Figure 4) do not meet the recitation of being between "said first lines." Thus, for these two reasons, this step is also not taught.

Claim 40 concludes with the step of "(d) fixing said flexible member at its opposite ends onto said first surface of said signal processing circuit substrate such that said value adjustment portion is exposed through a through-hole formed through said signal processing circuit substrate."

ANDERSON et al. do not teach a through-hole formed in the circuit substrate. Nor do ANDERSON et al. teach fixing a bent flexible member to the circuit substrate.

Rather, ANDERSON et al. only teach how to bend a circuit substrate, which bending does not relate to claim 40 or the claims depending therefrom.

In view of ANDERSON et al. failing to teach any of steps a-d, the obviousness rejection is not believed to be viable.

Further, the Official Action stated that McLAUGHLIN et al. would make it obvious to "include a value adjustment portion into the Anderson et al. flexible circuit board because the bent [circuit board] structures included in Anderson et al. provide convenient apertures through which a value adjustment portion could extend." As noted, no teachings in ANDERSON et al. were found as to apertures. Even if apertures are added to ANDERSON et al. and a value adjustment device attached at an aperture, one only has a value adjustment device attached in a conventional manner (not as recited) to a bent circuit board. That is not what claim 40 recites since claim 40 recites mounting the device to a flexible member, bending the flexible member, and then mounting the bent flexible member to the substrate.

Also note, as the Official Action proposes, the variable device would need to be mounted to the bent circuit

board, i.e., step "a" performed after step "c". This is not as recited.

For all the above reasons, allowance of claim 40 is solicited.

Claim 47 is also rejected based on ANDERSON et al. For the reasons stated above, the rejection as to ANDERSON et al. is also not believed to be viable. Accordingly, allowance of claim 47 is also solicited.

The dependent claims are also believed to be allowable in their own right. Allowance of the dependent claims is solicited at least for depending from an allowable independent claim.


In view of the above, Applicants believe that the present application is in condition for allowance and an early indication of the same is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and claims. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Respectfully submitted,

YOUNG & THOMPSON

By


Eric Jensen
Attorney for Applicants
Registration No. 37,855
745 South 23rd Street
Arlington, VA 22202
Telephone: 521-2297

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Page 5, the last paragraph, spanning pages 5-6, has been replaced as follows:

--In one aspect of the present invention, there is provided a signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of the signal processing circuit substrate, the device having a variable value and including an value adjustment portion through which the variable value is adjusted, the signal processing circuit substrate including a mounting member to which the device is electrically and mechanically connected such that the value adjustment portion faces a through-hole formed throughout the signal processing circuit substrate, the mounting member being fixed at opposite thereof onto the first surface of the signal processing circuit substrate.--

Page 7, the last paragraph, spanning pages 7-8, has been replaced as follows:

--There is further provided a signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of the signal processing circuit substrate, the device having a variable value and including an value adjustment portion through which the variable value is adjusted, the signal processing circuit substrate being formed with a through-hole, the signal processing circuit substrate including a flexible arch-shaped member having a height

relative to the first surface of the signal processing circuit substrate, the device being electrically and mechanically fixed onto a lower surface of the member in a floating condition above the signal processing circuit substrate such that the value adjustment portion is in alignment with the through-hole so as to allow the value adjustment portion to be adjusted through the through-hole, the member being fixed at opposite edges onto the first surface of the signal processing circuit substrate.--

Page 9, the last two paragraphs has been replaced as follows:

--In another aspect of the present invention, there is provided a method of fabricating a signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of the signal processing circuit substrate, the device having a variable value and including an value adjustment portion through which the variable value is adjusted, the method including the steps of (a) mounting the device onto an upper surface of a flexible member such that the value adjustment portion upwardly faces, (b) bending the flexible member at first lines thereof towards the lower surface, (c) bending the flexible member at second lines towards the upper surface, the second lines being located between the device and the first lines, and (d) fixing the flexible member at its opposite ends onto the first surface of the signal processing circuit substrate such that the value adjustment portion is

exposed through a through-hole formed through the signal processing circuit substrate.

The method may further include the step of (e) fixing a reinforcing plate onto a lower surface of the flexible member, the step (e) being [to be] carried out before the step (d).--

Page 10, the last paragraph, spanning pages 10-11, has been replaced as follows:

--There is further provided a method of fabricating a signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of the signal processing circuit substrate, the device having a variable value and including an value adjustment portion through which the variable value is adjusted, the method including the steps of (a) patterning a flexible printed circuit sheet into patterns which will make flexible printed circuits, (b) covering the flexible printed circuit sheet with an electrical insulator, (c) mounting the device on a second surface of the flexible printed circuit sheet, (d) cutting the flexible printed circuit sheet into flexible printed circuits, (e) downwardly bending the flexible printed circuit sheet at first lines across the device, (f) upwardly bending the flexible printed circuit sheet at second lines across the device, the second lines being located between the device and the first lines, and (g) fixing the flexible printed circuit sheet onto the first surface of the signal processing circuit substrate such that the value adjustment

portion of the device is in alignment with a through-hole formed throughout the signal processing circuit substrate.--

Page 11, the first full paragraph has been replaced as follows:

--The method may further include the step of (h) adhering a reinforcing plate on a first surface of the flexible printed circuit sheet across a width of the flexible printed circuit sheet, the step (h) being [to be] carried out prior to the step (d).--

Claim 1 has been amended as follows:

--1. (amended) A signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of said signal processing circuit substrate, said device having a variable value and including an value adjustment portion through which said variable value is adjusted,

said signal processing circuit substrate including a mounting member to which said device is electrically and mechanically connected such that said value adjustment portion faces a through-hole formed throughout said signal processing circuit substrate,

said mounting member being fixed at opposite edges thereof onto said first surface of said signal processing circuit substrate.--

Claim 20 has been amended as follows:

--20. (amended) A signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of said signal processing circuit substrate, said device having a variable value and including an value adjustment portion through which said variable value is adjusted,

said signal processing circuit substrate being formed with a through-hole,

said signal processing circuit substrate including a flexible arch-shaped member having a height relative to said first surface of said signal processing circuit substrate,

said device being electrically and mechanically fixed onto a lower surface of said member in a floating condition above said signal processing circuit substrate such that said value adjustment portion is in alignment with said through-hole so as to allow said value adjustment portion to be adjusted through said through-hole,

said member being fixed at opposite edges onto said first surface of said signal processing circuit substrate.--

Claim 40 has been amended as follows:

--40. (amended) A method of fabricating a signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of said signal processing circuit substrate, said device having a

variable value and including an value adjustment portion through which said variable value is adjusted,

said method comprising the sequential steps of:

(a) mounting said device onto an upper surface of a flexible member such that said value adjustment portion upwardly faces;

(b) bending said flexible member at first lines thereof towards said lower surface;

(c) bending said flexible member at second lines towards said upper surface, said second lines being located between said device and said first lines; and

(d) fixing said flexible member at its opposite ends onto said first surface of said signal processing circuit substrate such that said value adjustment portion is exposed through a through-hole formed through said signal processing circuit substrate, wherein,

the method steps produce a signal processing circuit substrate for a liquid crystal display unit with the variable value device mounted on the first surface of said signal processing circuit substrate.--

Claim 41 has been amended as follows:

--41. (amended) The method as set forth in claim 40, further comprising the step of (e) fixing a reinforcing plate onto a lower surface of said flexible member, said step (e) being [to be] carried out before said step (d).--

Claim 47 has been amended as follows:

--47. (amended) A method of fabricating a signal processing circuit substrate used for a liquid crystal display unit, a device being [to be] mounted on a first surface of said signal processing circuit substrate, said device having a variable value and including an value adjustment portion through which said variable value is adjusted,

said method comprising the sequential steps of:

(a) patterning a flexible printed circuit sheet into patterns which will make flexible printed circuits;

(b) covering said flexible printed circuit sheet with an electrical insulator;

(c) mounting said device on a second surface of said flexible printed circuit sheet;

(d) cutting said flexible printed circuit sheet into flexible printed circuits;

(e) downwardly bending said flexible printed circuit sheet at first lines across said device;

(f) upwardly bending said flexible printed circuit sheet at second lines across said device, said second lines being located between said device and said first lines; and

(g) fixing said flexible printed circuit sheet onto said first surface of said signal processing circuit substrate such that said value adjustment portion of said device is in

alignment with a through-hole formed throughout said signal processing circuit substrate.--

Claim 48 has been amended as follows:

--48. (amended) The method as set forth in claim 47, further comprising the step of (h) adhering a reinforcing plate on a first surface of said flexible printed circuit sheet across a width of said flexible printed circuit sheet, said step (h) being [to be] carried out prior to said step (d).-